Medication Error Prevention: Improving Patient Health Outcome

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Medication Error Prevention: Improving Patient Health Outcome

Brigitta van Ewijk

University of San Francisco
Abstract

Medication administration errors were reported to have an error rate of 60% in early research mainly in the form of the wrong dose, time, or rate. Working conditions were found to be one of the main contributors to these errors. Recognizing and reporting medication errors are key to the implementation of the reduction of this critical health problem (Hughes & Blegen, 2008).

DataRay Inc. (n.d.), states that almost one in five medication doses administered in hospitals is given in error. The two most common errors were (1) dispensing medicine at the wrong time (43% of incidents) and (2) omitting a dose (30%). The goal is to increase the nurses’ awareness of the different processes of medication administration and how error-prone these are.

The medication observation will take place during the hours of 0700-1000, and the nurses will use orange vests with “MEDICATION PASS IN PROGRESS; PLEASE DO NOT DISTURB” during the medication administration process for reduction and prevention of interruption. The nurses will be observed for correct use of the electronic health record system (EHR) during the transcription process throughout the day shift (0730-1530).

The result of the project is to prevent the occurrences of medication administration errors by paying close attention to the processes involving patients. The goal is also to improve the use of strategies to avoid medication errors, the method of detection and audits, and increase the use of information technology available to the nurses.
Medication Error Prevention: Improving Patient Health Outcome

The medication administration process should be as error-free as possible. The nurses need to be diligent in discouraging interruptions to prevent harm to the patients who are being cared for. Medication administration errors are a constant occurrence on the unit, and patient safety must be a focus. The nurses need to be supported during the medication administration process to minimize errors from the beginning of the process until the time of administration. During the time of medication administration, these nurses will not be interrupted by phone calls, patients, or other staff members. They need to be encouraged to complete the appropriate steps to medication administration such as the medication administration record (MAR) and proper identification process. Even though the statistics of the Institute of Medicine (IOM) report of 1999 might sound outdated, they are still being used to show the devastating results of medical errors (Kohn, Corrigan & Donaldson, 2001).

Kohn et al. (2001) note in their (IOM) 1999 report that medication errors alone were estimated to account for over 7,000 deaths per year at that time. The reports, articles, and reviews written about medication errors have all shown that these errors occur on a regular basis in hospital settings. Many studies and reports quote the 1999 IOM report regarding the 44,000-98,000 people who die annually to the effects of medical errors. Studies have shown that the fatal effects of medication errors have not decreased even after the initial report. The number of preventable adverse drug events totaled 89,845 in 2005 as reported by the Food and Drug Administration (FDA) as the number of sentinel events for the same period more than doubled to 15,107 (Kohn et al., 2001; DataRay Inc., n.d.).

The reason for choosing this issue, is that medication errors continue to plague the unit on a regular basis due to (1) medications being missed when prescribed, not transcribed and/or at
times not co-signed by licensed nurses; (2) not removed from the medication cassettes when discontinued; (3) not correctly sent to the pharmacy for relabeling when dosages change (4) not refilled when needed, leaving the next nurse with no medication to administer; (5) nurses not performing medication wastes in a timely matter; (6) interruptions during medication pass continue to be a daily occurrence (7) resistance to using the electronic health records (EHR) per protocol.

The interventions for the medication administration error issues are: (1) educating and observing the nurses during the administration, (2) encouraging the use of the EHR to check the medication if there is any question for clarification, (3) encouraging the use of medication administration records (MAR) when dispensing medications from the Omnicel, (4) preventing interruptions during the administration time. While errors cannot be reduced to zero, but healthcare providers can strive to reduce the instances in which error harms a patient to zero. Several health organizations have focused attention on medication safety and compiled recommendations for safe medication practices in inpatient environments (Kohn et al., 2001). The goal of the project is to improve the rate of error-free medication administration by decreasing the medication error rate by a minimum 50% through implementation of interventions such as education, encouragement, and daily check-ins with the direct care nurses with an August 15, 2018 deadline.

Methods

The clinical microsystem assessment’s five P’s were utilized to collect information, implement and evaluate the plan to reduce and prevent medication administration errors during the observation process (See Appendix B). The SWOT analysis also provided the necessary information to be able to analyze and evaluate the interventions (See Appendix C). A
PDSA/PDCA cycle was also utilized during this period (See Appendix D). The interruption and medication errors are measured to show the correlation between the two in separate plots, a scattered diagram, and a regression analysis of the collected data (See Appendix E, F).

The vision of the facility is to deliver individually focused care that improves physical and emotional well-being, supports community integration, and creates possibilities to help people engage with the world around them. The goal is to reduce and prevent medication administration errors and avoid any harm to patients in the care of the nurses.

As healthcare providers and frontline caregivers, the nurses need to use the correct processes to reduce and prevent errors from transcribing to the administration of the medication. The nurses need to be supported in completing the medication administration with (1) a progressive decline in interruptions, (2) the use of the MAR during the preparation of medications, (3) and the use of the proper identifiers. It is essential for the nurses to utilize the correct identifiers for medication administration- they are discouraged from administering medication from memory (Nelson, Batalden & Godfrey, 2007).

The nurses utilize the “MEDICATION PASS IN PROGRESS; PLEASE DO NOT DISTURB” vest to decrease the rate of interruptions during the medication administration (See Appendix G). Nurses on the day shift are observed during the administration process to collect data and to assess for areas of improvement. Double-check for high alert medications such as coumadin and insulin is required and written in the policy and procedures of the facility. The two nurses conducting the double-check need to read the order independently and the second nurse needs to check the order as written in the MAR. The second nurse should initial after the administration is completed (Institute for Healthcare Improvement, 2018).
Medication administration errors occur on a daily basis, and nurses know that there are professional responsibilities associated with medication administration. Nurses need to remember that they need to follow the code of ethics as they care for patients. Beneficence and non-maleficence are easy to violate. Lack of knowledge and ignorance of the nurse’s responsibility can lead to medication administration errors putting the patients in harm’s way. Nurses are accountable and responsible for their action during the care of patients and need to promote, advocate for, and strive to protect the health, safety and the rights of patients (Burkhardt & Nathaniel, 2008). Ongoing education to improve medication safety is imperative for patient best health outcome. Direct observation of medication administration has been used for the collection of data and evaluation of the outcome (Hughes et al., 2008).

**Results**

Nurses have been interviewed to survey the process, and some were hesitant to continue to use the vest citing that they were still being interrupted during the early stages of the use of the vest. All nurses on the day shift have been encouraged to continue and remind residents and staff to respect the use of the vest. During the latter stages of the process, all nurses utilized the vest and the interruption rate reduced. The regular staff on the unit received reusable vests while there were disposable vests for float staff.

The use of the “MEDICATION PASS IN PROGRESS; PLEASE DO NOT DISTURB” vest has been implemented to reduce the rate of interruptions during the medication administration process. It was first introduced by addressing the crucial times the nurses were called and stopped to ask for assistance during the time of medication administration. The vest is used to deter other staff and residents from calling on the nurse when the vest is being utilized. During the time of the project, the interruptions have significantly decreased as the calls meant
for the nurses (unless an emergency), were held, answered by the charge nurse, or a message was taken and relayed to the nurse to handle after medication administration was completed. Real double checks of insulin on the day shift has proven to have increased during the observation time. The nurses were aware of the importance of patient safety and checked for the correct medication for the correct resident, expiration date, correct dose, and correct time and route. The documentation has also improved as it was done as per policy.

The medication error rate has been reduced significantly during the observation time due to the nurses’ attention to detail during the medication reconciliation process, and the off shifts were also asked to follow up by doing at least two checks on the electronic clinical works (eCW) system and properly complete the 24-hour checks. There continue to be errors and nurses are being held accountable for their share of the mistakes. Medications administered without confirming that the correct dose is ordered and entered in the Omnicel continues to occur but is now a rare occurrence on the day shift. Using a fishbone diagram, the cause of the medication errors are outlined (See Appendix J). This made it easy what to focus on. A flow chart of the medication administration process has been generated to follow the trend (See Appendix H) easily. The result of the observation of six nurses per day for ten weeks (five days per week) shows that there is a direct correlation between the interruptions and medication error rate (r=0.976). Additionally, a simple regression test reveals that the relationship is statistically significant (p<.0000) (See Appendix F).

Discussion

During the process of observation, the 5 P’s of the microsystem were assessed to have clearer insight and knowledge into the interdisciplinary team and what importance the process of medication administration holds (See Appendix B). Nurses are assigned ten residents during the
day shift. The residents on this specific unit have a complex anti-retroviral regimen along with high doses of narcotics. These narcotics are around the clock/scheduled and as needed. The medication count per morning medication administration pass ranges between 10-20 medications. The nurses need to be aware of the changes of the medications such as changes in dosage and time of administration of any narcotic, starting antibiotics, change of condition of the residents in their care. The process of medication administration is described in a flowchart and a SIPOC chart (See Appendix I).

The importance of the reduction of interruptions, following protocol, the correct use of the current technology, and acceptance of positive criticism during the medication administration process is proof of the reduction of medication errors. Interruption or distraction to the nurses during the process of medication administration has been widely identified as a leading cause of errors (Hayes, Power, Davidson & Jackson, 2014).

The use of the “MEDICATION PASS IN PROGRESS, PLEASE DO NOT DISTURB” vests assisted in reducing the usual interruptions. Nurses did not receive any calls during the medication administration time (0730-1000) to allow them to focus on the task at hand. Residents were reminded not to disturb the nurses during this time as CNAs were encouraged to answer the call lights when notified on their Cisco phones. The unit clerk rerouted all calls to the charge nurse if these were medication, procedure and patient-related, and took messages when applicable. This intervention allowed the nurses to complete the medication administration in a timely manner as they prepare for the implementation of the unified EHR system in August of 2019.

Medication administration error reduction has been successful during the project as the nurses were being observed, collected the necessary data, conducted the weekly check-ins and
education which aided the nurses to understand how to keep errors down. The nurses agreed to make a conscious effort to use all the EHR systems to retrieve the appropriate information to complete the medication transcription and check process. In preparation for the unified EHR system, all staff is encouraged to enter vital signs, document and check medication orders using the current EHR systems. Information technology interventions have great potential to reduce the rate of medication errors. The Medication Errors Reduction Act of 2001 has been introduced to establish a grant program for hospital and skilled nursing facilities that use healthcare information technology to reduce medication error rates and improve patient safety (Kaushal & Bates, 2002). Some strategies to prevent medication errors are the establishment of hospital intranet that offers rapid access, information; use of medication administration barcode technology that offers the capability to retrieve essential medication information (Athanasakis, n.d.).

Education about pharmacology topics and provision of educational opportunities all procedures involving the use of medication will be critical in preventing medication errors. Having regularly scheduled in-services to keep the staff updated with the changes in medications and policies surrounding these topics (Athanasakis, n.d.). Audits are educational activities that promote high-quality care and should be carried out regularly.

The PDSA/PDCA cycle offers a look at the improvement process where the problem is identified, documented and analyzed, the plan implemented as a pilot project, and the next step will be to standardize the plan on the other shift and eventually in the facility (Appendix D; Montesi & Lechi, 2009). Independent double checks and even triple checks of insulin on the day shift increased during the observation time. The nurses were aware of the importance of patient safety and checked for the correct medication for the correct resident, expiration date, correct
dose, and correct time and route. The documentation has also improved as it is being completed as per policy.

The Institute for Safe Medication Practices (ISMP) recommended the use of independent double checks of high alert medications due to the increased harm to patients. Utilizing the “rights of medication administration” is crucial to the reduction of error rate and harm to patients. Through regular medication, reviews and proper medication reconciliation the nurses ensure that all medications in the MAR correlate/match with the orders the eCW and the physicians’ order sheet (POS) and that the indications for the medications are correct (Maryniak, 2016; Vickerie, 2017). By utilizing the fishbone diagram, the cause of the medication errors are analyzed, and interventions are implemented (See Appendix J).

This project has provided opportunities for improvement, and through collaboration with the nurses, physicians, and pharmacy staff, the medication error rate has significantly decreased (See Appendices E, F). The reasons for the success was the effort the nurses put in working on reducing the medication rate and followed the plan. The nurses have put in energy to improve their patients’ health outcome, made small, but significant changes in their work during the medication administration process.

**Conclusion**

Medication administration is a crucial part of the care nurses provide to the patients. This process will never be error-free, but with continuous education geared to new and necessary changes in medications; drug interactions and formularies; patients’ allergies and drug sensitivity; using the correct reconciliation and administration protocol during the process (paying attention to under or over-medicating, or omission); nurses need to be aware of the harm errors can cause to patients. Interruptions are difficult to eliminate without any interventions and
with the implementation and use of the orange vest, observation, education and collaboration of
the charge nurse and unit clerk, the nurses have experienced a significant decrease in
interruptions and administration errors during the morning medication pass on the unit. As this
test of change continues to have positive results, the nurses will notice the time saved and there
will be an increase in patients’ health outcome improvement.
References


Appendix A

Evidence-Based Change of Practice Project Checklist

STUDENT NAME: Brigitta van Ewijk

DATE: May 21, 2018

SUPERVISING FACULTY: University of San Francisco

Instructions: Answer YES or NO to each of the following statements:

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.
Appendix B

Microsystem’s 5 P’s

5P's

Purpose
To provide patient-centered care with error-free medication administration under the care of the nurses

Patterns
What occurs on a regular basis and what can be done to improve quality

Patients
The patients receiving the services from the nurses (medication, treatments)

Processes
Starting at the day of admission, the process implemented for the patient during his/her stay in the facility

Professionals
The nurses administering medications to the patients
Appendix C

SWOT Analysis

**S**
- Skilled nurses
- Undivided attention during the medication administration process
- Increased nurses' critical thinking process
- Support for the project
- Ability to administer large volume of medications with minimum to no interruptions
- Use of the interventions and technology

**T**
- Resistance from nurses
- Inadequate responses from nurses
- Experienced staff retiring due to introduction of new processes

**O**
- Improve patient health outcome
- Interventions to support the nursing staff
- Support nurses to decrease medication errors
- Increased use of technology
- Allow nurses to reach out to get clarifications and ideas for keeping the medication errors to a minimum

**W**
- Limited time frame for the project
- Collected data on paper (not digitized)
- Different EHRs to gather information and conduct medication checks
- Poor (gaps) communication
Appendix D

PDSA/PDCA

**P: Plan**
- Survey the nurses’ response to the reasons for interruptions that lead to the medication administration errors.

**D: Do**
- Implement interventions to aide in medication administration error reduction by introducing the vest utilization
- Hold calls during the crucial time of medication administration.

**A: Act**
- Evaluate the medication administration process test of change and get feedback from the day shift nurses.
- If intervention has positive outcomes, roll info out to the next shifts.

**S/C: Study/Check**
- Start a small test of change on the day shift by utilizing the “Medication administration in progress, please do not disturb” vest
- Do not transfer calls during the morning administration time to the nurses but redirect these to the charge nurse or take a message which can later be handed to them.
- CNAs asked to answer all calls from the patients when notified on their Cisco phones to aide in lessening the interruptions for the nurse.
Appendix E

Plots and Scatter Diagrams

<table>
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<th>Date</th>
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<th>Y</th>
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<td>14</td>
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<td>6/8</td>
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<td>14</td>
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<td>6/15</td>
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<td>7/20</td>
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<td>7/27</td>
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Notes: X = interruptions, Y = errors

\[ Y = 0.035X + 0.7713 \]
\[ R = 0.976 \]
Appendix F

Regression Analysis

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<th># Interruptions</th>
<th># Errors</th>
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<tr>
<td># Errors</td>
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**SUMMARY OUTPUT**

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<tr>
<td>R Square</td>
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<td>Adjusted R Square</td>
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<tr>
<td>Standard Error</td>
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<td>Observations</td>
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**ANOVA**

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<th>SS</th>
<th>MS</th>
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<td>138.0537</td>
<td>141.3835479</td>
<td>6.76168E-06</td>
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<td>6.83513932</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Std Error</th>
<th>t Stat</th>
<th>P-value</th>
<th>Lower 95%</th>
<th>Upper 95%</th>
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<tr>
<td>Intercept</td>
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<td>1.01752</td>
<td>0.34277796</td>
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<td>0.00294548</td>
<td>11.89048</td>
<td>6.76168E-06</td>
<td>0.028058257</td>
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</table>

Regression analysis of data reveals that the variables are not only highly correlated (r=0.976) but also statistically significant: p-val < 0.0000.
Appendix G

Vests Utilized

Reusable vest:

Disposable vest:
Appendix H

Flow Chart of Medication Administration

Pharmacy

Licensed Nurse (LN)

1. START
   Review MAR and prepare medication cart for med pass

2. Remove routine controlled substances & other meds from Omnicell and other locations

3. Prioritize residents and confirm they are ready for med administration

4a. Follow policy or change of condition workflow

4b. Evaluate which meds can be safely administered

5. Pull meds from cart based on MAR and prepare as appropriate

4. Are assessments within parameters (vital signs & blood sugar)?

6a. Contact pharmacy via webconnect and fax notes as needed

6b. Review med refill request & refill

6c. Picks up meds from pharmacy

6. Are any meds missing?

7. Administer medications & observe precautions as necessary; @nd LN signs if necessary

8. Document administration, holds or refusal of each individual med in MAR; notify physician as needed

9. Document controlled substance waste in Omnicell as needed; 2nd LN co-signs

10. Monitor for response to treatment or adverse reactions; intervene as needed
Appendix I:

SIPOC Process of Medication Pass

<table>
<thead>
<tr>
<th>Suppliers - Who sends work or materials?</th>
<th>Inputs - What is required to do the work?</th>
<th>Process Step - What is done to provide value?</th>
<th>Outputs - What is provided/sent to others?</th>
<th>Customers - Who receives/benefits from the work?</th>
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</thead>
<tbody>
<tr>
<td>Pharmacy Nutrition Central supply HIS</td>
<td>MAR Cart Medications supplies</td>
<td>Review MAR and prepare medication cart.</td>
<td>Properly stocked med cart</td>
<td>Residents LN Physician pharmacy</td>
</tr>
<tr>
<td></td>
<td>Omniscan MAR Med refrigerator Supplies medications</td>
<td>Remove routine controlled substances and other medication from Omniscan and other locations.</td>
<td>Non medic cart medication ready for administration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAR Appointment schedule</td>
<td>Prioritize residents and confirm resident is ready for med administration.</td>
<td>Resident ready</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biomedical equipment and supplies MAR Resident</td>
<td>Assessment and monitoring of resident prior to med administration if needed. Vital signs, blood sugar</td>
<td>Safe to administer meds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Webconnect for pharmacy Medications MAR Med cart Supplies</td>
<td>Pull meds from cart based on MAR and prepare as appropriate, if missing notify pharmacy.</td>
<td>Meds prepared</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Policies and Procedures Residents LN MAR Medications Supplies</td>
<td>Administer medication. Observe precautions as needed. Get a second nurse to cosign if needed.</td>
<td>Med administered safely</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAR LN supplies</td>
<td>Document administration, holds or refusal onto MAR per medication per patient. Notify physician as needed</td>
<td>Med administration documented</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suppliers - Who sends work or materials?</th>
<th>Inputs - What is required to do the work?</th>
<th>Process Step - What is done to provide value?</th>
<th>Outputs - What is provided/sent to others?</th>
<th>Customers - Who receives/benefits from the work?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy Nutrition Central Supply HIS</td>
<td>MAR LN Supplies Omniscan Medical waste bin</td>
<td>If there is a controled substance waste then document in omniscan with another LN to co-sign.</td>
<td>Med waste documented</td>
<td>Residents LN Physician pharmacy</td>
</tr>
<tr>
<td></td>
<td>Med cart LN</td>
<td>If it is the scheduled cassette exchange day, LN prepares med cart for exchange.</td>
<td>Med cart prepared</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New cassettes medication</td>
<td>Tech delivers cassettes to neighborhoods between 10:30 am – 11:00 am. New cassettes are placed in med cart.</td>
<td>Med cart is restocked</td>
<td></td>
</tr>
<tr>
<td>Physician orders eCW CS-1 Pharmacy Delivery carts</td>
<td>After the exchange, if there is new medication pharmacy disperses the amount of medication up to the next cassette exchange.</td>
<td></td>
<td>Update medication</td>
<td></td>
</tr>
</tbody>
</table>
Appendix J

Fishbone Diagram

Environment:
During the time of the use of the vein, interruptions by staff talking to and transferring calls to the administration nurses. Patients asking for assistance during the medication administration period.

Equipment:
The unified EHR the facility is moving toward will include BCMA. The nurses are now noted to use the Omniscan to dispense medication without the MAR. Different EHR systems are used at this time to retrieve information.

Leadership:
Facility implementing the Lean process. Will focus on all of the equipment in the correct manner. The preparation of the unified EHR system.

Communication:
Q prescription to nurse and it clerk transcription, se of eCW for medication orders checks and prescriptions.

People:
- MDs prescribe the medications and treatments
- Pharmacy filling orders and dispensing treatments to the unit
- Nurses who transcribe or assign the medication orders and administer the medication
- Unit clerk transcribes medications and treatment when written in the POS and in the eCW

Procedures:
MDs write orders in the POS instead of eCW or can assign the orders to themselves or to the wrong discipline.